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# Resume

## **Ajay Kumar, PhD student**

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## **Education:**

From October 2010 PhD student in Experimental High Energy Physics at Dept. of Physics and Astrophysics, University of Delhi, India

2008 to 2010 M.Sc in Physics with electronics as specialization from Dept. of Physics & Astrophysics, Registered at Hindu College, University of Delhi, India

2005 to 2008, BSc. (H) in Physics at Acharaya Narendra Dev College, Kalkaji, University of Delhi, India

2001 to 2003 ,10+2 (Intermediate) from Central Board of Secondary Examination at Jawahar Navodaya Vidyalaya, Nawada, Bihar

2001, 10<sup>th</sup> (Metric) from Central Board of Secondary Examination at Jawahar Navodaya Vidyalaya, Nawada, Bihar

## **Research Experience:**

I am working towards my thesis topic "Discovery Potential of New Particles in Large Momentum Transfer Processes at Hadron Colliders" since October 2010. My research interest includes High Transverse Momentum ( $P_t$ ) particle production in proton-proton collisions in the CMS (Compact Muon Solenoid) Experiment at the LHC (Large Hadron Collider) CERN. I have worked on various aspects of Higgs searches analysis in WW decay mode of the Higgs, mainly with semileptonic final state. These include higgs production through gluon-gluon fusion and vector-boson fusion. I have also worked on Calibration of CMS tracker.

### Conference Attended:

The XXV International Symposium on Lepton Photon Interactions at High Energies (**Lepton Photon 11**) was held at the Tata Institute of Fundamental Research, Mumbai, India, from 22 to 27 August 2011.

### School Attended:

**1. SERC-EHEP 2011** at VECC, Kolkata, India the VIII SERC-EHEP School was held in the VECC campus, Kolkata during 20/06/2011 to 10/07/2011.

**2. HCPSS2012:** 7th Fermi lab-CERN Hadron Collider Physics Summer School held at Fermi lab, August 6-17 2012.

### Publications and Conference Talks:

1. CMS-PAS-HIG-12-021  
**"Search for the Standard Model Higgs boson in the H to WW to  $\ell\nu jj$  decay channel"**  
Ajay Kumar, Kirti Ranjan+ Others
2. CMS PAS HIG-12-046  
**"Search for the Standard Model Higgs boson in the H to WW to  $\ell\nu jj$  decay channel in pp collisions at the LHC"**  
Ajay Kumar, Kirti Ranjan+Others
3. Oral Talk on **"Search for the Standard Model Higgs boson in H  $\rightarrow$  WW  $\rightarrow$   $\ell\nu q\bar{q}$  decay mode"** in XX DAE-BRNS High Energy Physics Symposium, *Visva-Bharati, Santiniketan, INDIA*
4. CMS-PAS-HIG-13-008  
**"Search for a Standard Model-like Higgs boson decaying into WW to  $\ell\nu q\bar{q}$  in pp collisions at  $\sqrt{s} = 8$  TeV"**  
Ajay Kumar, Kirti Ranjan+ Others

### Awards & Honours:

**The Council of Scientific & Industrial Research (CSIR), National Eligibility Test NET**, June 2010 & December 2010

**Graduate Aptitude Test in Engineering (GATE) 2010**

**Joint Entrance Screening Test (JEST) 2010**

**First position** in BSc (H) physics in Acharya Narendra Dev College, University of Delhi.

### Projects & Presentations:

Ph. D. Registration Confirmation Talk on the topic **"Discovery Potential of New Particles in Large Momentum Transfer**

**Processes at Hadron Colliders”** under the able guidance of Advisory committee members Prof. D. S. Kulshreshtha and Dr. Md. Naimuddin and my Supervisor Dr. Kirti Ranjan.

Pre Ph. D. Project under course work in **“Particle Physics”** on the topic **“Deep Inelastic Scattering”** under the able guidance of Prof. D. Choudhury and Dr. Kirti Ranjan.

Pre Ph. D. Project under course work in **“Statistics & Computer Applications”**

On the topic **“Study of Longitudinal beam dynamics in Acclector using Numerical Methods & Error Analysis”** under the able guidance of Dr. Awadhesh Prasad and Dr. Kirti Ranjan.

**M.Sc. Project: “Microcontroller based Fire security system in petrochemical industries”** under the able guidance of Dr. Amithabh Mukharji, Dr. Vinay Gupta, Dr. K. Srinivashan at Electronics lab, Department of physics and Astrophysics, University of Delhi.

**BSc. Project: “Study effect of UV radiation on ZnO Thin films and fabrication of ZnO films using sputtering methods”** under the able guidance of Prof. Vinay Gupta, at Department of physics and Astrophysics. University of Delhi.

## **Computer and Technical skills:**

- ✓ Operating systems well versed with Linux and Windows
- ✓ Computer Languages known C++, Pascal, python and shell scripting
- ✓ Software Application ROOT, CMSSW
- ✓ Language : fluent in English & Hindi

## **Employment and related experience & activities:**

**Current Position:** Ph. D. Scholar at Dept. of Physics & Astrophysics, University of Delhi, Delhi, India.

I am doing research in experimental particle physics on the topic “Higgs searches at Compact Muon Solenoid (CMS) Detector, Large Hadron Collider (LHC), CERN, Switzerland. I basically do analysis on Data collected from this experiment. I use specially developed software for CMS called CMSSW for the analysis. I am also working on Calibration of CMS tracker.

### **H->WW->Itau (Hadronic) analysis:**

August 2011 to February 2012

I started my active research work with the feasibility studies of the H->WW->Itau (Hadronic) channel, which is considered in CMS for the first

time to increase the sensitivity of the dileptonic channels. We Presented results in H->WW subgroup meetings.

### **Visit to CERN:**

28th March-14th June 2012

1. Started working in H->WW->lnuqq analysis for the ICHEP 2012 update, worked on object selection, Data processing.
2. Took tracker offline shifts from CMS centre.
3. Started working on ESP task (3 main months), which involve Alignment Position Errors study a) Investigate consequences of APE=0 for tracking b) Determine APE values fitting to the alignment precision.

### **Visit to Fermi lab:**

4<sup>th</sup> August 2012 to 4<sup>th</sup> Jan 2013

1. Attended HCPPS2012 from 4<sup>th</sup> to 17<sup>th</sup> August held at fermilab.
2. Continued working in collaboration with lnujj group at LPC.
  - 2a) Actively worked on H->WW->lnuqq analysis optimized for higgs production through gluon-gluon fusion for the HCP 2012 update.
  - 2b) Started working on low mass higgs study, i.e. higgs at 125GeV H->WW->lnujj. Feasibility study is done. This involved development of New Jet selection technique based on TMVA using Monte Carlo truth information.
  - 2c) Working on expanding the analysis to include vector boson fusion contribution.

### **Visit to CERN:**

14<sup>th</sup> March 2013 to 14<sup>th</sup> June 2013:

1. Working on exploring different way of selecting VBF tag and W jets to have best efficiency.
2. Have been working on estimation of Alignment parameter error and validation of alignment with 2012, 8 TeV data and Monte Carlos.
3. Working on data processing in collaboration B2G group.
4. Took DQM offline shifts which involved certification of 2012 re-reco data for all sub detectors.